

Disability Assignment: Traumatic Brain Injury
EDUC 575
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Traumatic Brain Injury

Cause/Etiologic and Prevalence

Traumatic brain injuries (TBI) can occur in males or females at any given time period in their lives after birth. A 2017 study by Rao et al, defines a TBI “a direct blow to the head, face, neck or elsewhere on the body with an impulsive force transmitted to the head, resulting in rapid onset of short-lived impairment of neurologic function” (Rao et al., 2007). The etiology of a traumatic brain injury can be from many sources. Some examples of external force may be, but not limited to: a fall, motor vehicle accident, shaken baby syndrome or a sports injury.

Brain injuries in Canada are particularly alarming to our public health care system. A 2017 study by Rao et al. found that approximately 155000 people sustained reported traumatic brain injuries in 2014 and the number of people who are experiencing these types of injuries has increased between 2005-2014 and is expected to continue to rise (Rao et al., 2017). This study also found that people age 18-34 are accounted for more than one third of those injured during the reviewed time period and the population of Elderly adults age 60+ continue to rise in relation to TBIs each year (Rao et al., 2017). Although males have historically experienced more head injuries than females in the past, this study indicated that the female population are currently a growing concern for risks of head injuries (Rao et al., 2017). The author of this paper hypothesises that may be due to the increase in sports participation among the female Canadian population. In Canada, sports facilities and venues were the highest reported locations for TBI (Rao et al., 2017). Globally, the criteria of a traumatic brain injury are variable depending on the country of residence, access to a health care professional and technology within that healthcare system to accurately diagnose (CT scan, MRI). A traumatic brain injury falls under the greater umbrella of acquired brain injuries. According to Adnan Aili Hyder, MD, a program director of health systems at John Hopkins Bloomberg School of public health:

“Traumatic brain injury (TBI), according to the World Health Organization, will surpass many diseases as the major cause of death and disability by the year 2020. With an estimated 10 million people affected annually by TBI, the burden of mortality and morbidity that this condition imposes on society, makes TBI a pressing public health and medical problem” (Hyder et al., 2007).

Distinctive Physical Characteristics Associated With the Disorder:

Not Relevant

Physical Health Abilities/Challenges:

Physical health abilities depend on the individual and cause of injury. Physical changes can include persistent disturbances in vision, diminishing use of fine or gross motor skills, changes in dysarthria, ambulation as well as mobility impairments (Rao et al, 2007). A common symptom of a traumatic brain injury is fatigue, headaches and disrupted sleep. These symptoms are often more frequent close to the date of initial injury, but often are lifelong in individuals with severe traumatic brain injury (Rao et al, 2007). Due to the nature of the injury and/or severity of the injury, consultation with a multi disciplinary rehabilitation team may be needed when bridging the gap between

hospital care and participation within the community (British Columbia Ministry of Education, 2000). It is also suggested that professionals work with physical therapists in understanding information critical for sitting, standing and ambulation (Sohlberg & Mateer, 2001, p. 90).

Educational implications.

Fatigue and sleeping patterns: The most common symptom to be cautious of with this population in regards to educational implications is fatigue and disrupted sleeping patterns. This may affect assessment, a way to address this is to assess frequently and after optimal conditions (after the individual has had a good nights sleep). Another adaptation that could be made in the learning environment is the use of a quiet room for the individual to rest in during high periods of fatigue (British Columbia Ministry of Education, 2000).

Seizures: Seizure medication can be invasive on cognitive functioning and impact route memory. Educators must be weary of regression in learning due to seizure activity or the acquisition of learning due to medications (British Columbia Ministry of Education, 2000). Subsequently, educator must always be aware for the risk of seizures within this population, especially with individuals who have a history of seizures and seek medical attention as directed by a physician.

Cognitive Abilities/Challenges:

The knowledge of the impacts in cognitive abilities after TBI have been recognized for over the past quarter century and the emergence in further knowledge in the area is advancing every day (Sohlberg & Mateer, 2001, p. ix). Nature, location, degree of injury and history of injuries prior to the brain all effect cognition level (Sohlberg & Mateer, 2001, p. 101). Areas in cognition may effect the individual's executive functioning skills, ability to play, communication and academic learning. Overstimulation, stress and participation in new or unstructured activities may deteriorate their ideal learning conditions (British Columbia Ministry of Education, 2000). For impairments in general cognition, the Wheshler Adult Intelligence Scale- III (WAIS), is used to assess cognitive abilities and deficits in adults (Sohlberg & Mateer, 2001, p. 102). The most common areas in cognition affected by a TBI are attention, memory and learning, executive functioning and disorders of orientation/arousal (Sohlberg & Mateer, 2001, p. 101).

Educational implications.

Attention and concentration: Focused, sustained, selective, alternating and divided attention are the sub-areas within attending that can be specifically exaggerated by a TBI (Sohlberg & Mateer, 2001, p. 151) This is often a frustrating area for younger individuals who are attending school or older individuals when returning to work. Attention process training may be used to increase the individual's ability to attend by using cognitive exercises (Sohlberg & Mateer, 2001, p.133). Use of strategies and environmental supports may be implemented by setting the clients environment up in a way that encourages attention and concentration, these supports may be monitored by support staff or self monitored systems implemented by the individual themselves (Sohlberg & Mateer, 2001, p. 133). External aids are highly useful in following and organizing information (Sohlberg & Mateer, 2001, p. 134). In the writer's experience, these are best-adapted using bulletin boards with sticky notes in older clients or clients

with less experience pre injury with technology, or adapted on smart phones with alarms and reminders for clients with experience with these devices.

Memory and learning: The stages in memory that could be impaired are attention, encoding, storage and retrieval (Sohlberg & Mateer, 2001, p 162-164). Again, specific assessment measures as mentioned above are needed to determine where the client is at memory wise. These impairments can be short term or long term and can impact many other domains such as speech, motor abilities, social, and more. Nondeclarative learning is suggested in the Neuro rehabilitation world, this is when the learner recalls or practices skills without conscious awareness that learning is taking place and is broken down into two types such as Priming and Procedural learning (Sohlberg & Mateer, 2001, p. 169). An example of priming would be to 'trigger' recollection of memory using prompts. Procedural Learning, which is where the learner is taught the acquisition of skill or the learning pattern ((Sohlberg & Mateer, p. 169, 2001). This can be supported with behaviour analytic strategies such as Chaining or Total Task teaching or Task Analysis. Errorless Learning is also recommended with this population (Sohlberg & Mateer, 2001, p. 169), these teaching procedures also overlap with the behaviour analytic world. With school-aged individuals, the following accommodations may be considered such as adapting lesson presentation, assignments, projects tests and teaching in compensatory strategies ((British Columbia Ministry of Education, 2000. Wilson & Moffat (1992) recommend the following strategies when working with someone with memory deficits:

- Simplify information to be clear and concise with instruction.
 - Reduce the amount of information to be remembered.
 - Check for understanding.
 - Try to help the person link information to existing information. Make associations.
 - Set up practice regimens with distributed practice; it is better to work at learning something a few minutes several times a day than for an hour one day.
 - Help individual's organized information that needs to be remembered.
 - Train individuals to use communication techniques that encourage processing meaning, such as paraphrasing, rehearsal and question asking.
- (Wilson & Moffet, 1992)

Executive functioning: Executive functioning is an area in cognition that can be affected by a TBI, "Executive functioning refers to cognitive abilities involved in the initiation, planning, sequencing, organization, and regulation of behaviour" (Sohlberg & Mateer, 2001, p. ix). These impairments can impact a person's level of independence. An educator may first need to focus on improving memory skills and environmental manipulation to facilitate learning in executive functioning. Ylvisaker et al. explains that assessing and selecting an appropriate intervention for teaching executive function is extremely specific and must include the individual in goal setting (Ylvisaker et al., 2019)

Language/Communication Abilities/Challenges

Communication and language can be affected by a TBI. Aphasic disturbances are rare but do occur, but language and communication abilities are often impacted depending on cognitive impairments (NR, 306). Cognitive based verbal impairments encompass a

number of symptoms: “language that is confabulatory, tangential, fragmented, and or devoid of content” (Sohlberg & Mateer, 2001, p. 306). Furthermore, psychosocial impairments to language and communication may effect the persons ability to use language in a social exchange and cause a pragmatics deficit which are often the most socially punishing consequence of communication impairments in social situations (Sohlberg & Mateer, 2001, p. 306).

Educational implications.

Communication: Receptive and expressive language may be impaired. This is often associated within impairments to memory (Sohlberg & Mateer, 2001, p. 306). Pragmatic affects a person’s ability to discriminate communication skills within a naturalistic, functional use of language (Sohlberg & Mateer, 2001, p. 308). Adapted technology such as a speech device may be used for individuals with more sever impairments. It has been suggested that for teaching language skill, an educator should aim a teaching within a naturalistic environment, this has also been supported within a new movement to client centered focus model which emphasises real life contexts for teaching (Sohlberg & Mateer, 2001, p. 319). Individualized communication skills training has been recommended with this population, where each individual is assessed and their individual communication needs are supported (Sohlberg & Mateer, 2001, p. 319).

Sensory Abilities/Challenges:

Sensory systems can be disrupted by a TBI. The nerve pathways sending and receiving stimulation may be directly injured (British Columbia Ministry of Education, 2000). Hypersensitivity, Hyposensitivity and perception impairments may affect individuals with TBI. These impairments are often chronic and rarely spontaneously recover; however de-sensitization or educational programs around these issues do exist.

Educational implications.

Hyposensitive and Hypersensitivity: Hyposensitive includes a reduction in ones ability to touch, smell, taste, hear and see. Hypersensitivity includes an increase in sensitivity to ones ability to touch, smell, taste, hear and see. Assessments should be done by an Occupational Therapist or psychologist to determine which condition applies to the individual, educator should be aware of these implications when teaching and should teach accordingly, for example: teaching an individual who is hyposensitive to touch to use a thermometer when eating hot foods.

Perception: How the individual perceives his or her environments has a huge effect on the ways they are interpreting information and learning (British Columbia Ministry of Education, 2000). Adaptations to the environment may be made to facilitate learning. The following table demonstrated adaptations the classroom suggested by the British Columbia Ministry of Education (2000):

Vision:

- Use enlarged print
 - Decrease the number of questions or amount of print per page
 - Have written materials read orally
 - Use taped or textual books
 - May need preferential seating
 - Turn off fluorescent lights when possible
- (British Columbia Ministry of Education, 2000).

Hearing/smell:

- Use visual cueing systems such as checklist to ensure understanding of directions
- Install flashing light signal as an adjunct to a fire alarm (British Columbia Ministry of Education, 2000).

Somatosensory/perception:

- May need reminders to test temperature
- May need gradual de-sensitization programs
- Use warning signs to indicate places of risk
- Use a multisensory presentation of materials
- Use a ruler to help scan the page
- Use large print books
- Provide a map and written instructions of class locations
- Assign a buddy
- Schedule classes in the same part of building when possible (British Columbia Ministry of Education, 2000).

Motor Abilities/Challenges

With a severe traumatic brain injury, the individual may use a wheelchair or other mobility aids due to subsequent damages to the body depending on cause of injury (Lezak & Obrien, 1998). These mobility aids may also be needed due to balancing impairments. Motor skills on average heal faster in children than in adults (British Columbia Ministry of Education, 2000). Hemiparesis may occur, resulting in paralysis on one side of the body, although this is not common (British Columbia Ministry of Education, 2000). As mentioned in previous sections, balance, fatigue and co-ordination have a greater impact on the individual's motor abilities and greater level of functioning.

Educational implications.

Fine motor and gross motor: Impairs motor planning skills (Apraxia) occurs in some individuals with TBI. A reduction in speed and dexterity may occur after an injury is common (British Columbia Ministry of Education, 2000). Individuals with Hemiparesis may need to switch their dominant hand (British Columbia Ministry of Education, 2000). The individual may return to regular activities with minor interruptions, but others may need mobility aids (wheelchair or cane) due to motor impairments, particularly with balance. Educators should be aware of level of physical demand during teaching (British Columbia Ministry of Education, 2000). SetBC may also need to be contacted for consultation for adaptive equipment or assistive technology (British Columbia Ministry of Education, 2000).

Social Emotional/Behavioural Abilities/Challenges and Educational Implications

In recent years, the studies of emotional and behavioural challenges post injury have emerged. Individual's habitual attitudes and patterns of behaviour may shift. Patterns of changes in temperament are common in these populations. Anger, anxiety, inappropriate social interactions and behaviours related to psychiatric disorders also may be present in this population (Lezak & Obrien, 1998). These impairments can be significantly damaging to a person's social life and the greater the impact of injury (mild TBI, Moderate TBI, severe TBI), the greater the social implications may be (Lezak & Obrien, 1998). Furthermore, these can cause individuals to socially withdrawal from

work, school and social contact and the length of social isolation can continue for long periods of time, making it harder to re-integrate within social structures (ie: emotional and behavioural disturbances such as social anxiety or depression) even with improvements in emotional and behavioural disturbances (Lezak & Obrien, 1998).

Educational implications.

Behavioural: The use of a behaviour plan supported by a function behaviour assessment is recommended. There is also evidence that a positive behaviour support plan is potentially a better contextual fit than traditional contingency management procedures due to the heavy focus on natural supports within the environment (Ylvisaker et al., 2007). Consistent feedback and differential reinforcement are valuable strategies with the reduction of problem behaviour. In relation to anger and frustration, allowing the student to exit the teaching area and regroup or using a functional communication-training program may be effective strategies.

Social and Emotional: The impairments to social and emotional areas of a person's life can be devastating. Psychotherapy or a behaviour plan is suggested with this population to increase the set backs in this area (Sohlberg & Mateer, 2001, p. 378, Ylvisaker et al., 2007). With a Psychotherapy approach, a strong therapeutic rapport must be established to build trust and establish a safe environment for learning to adjust to impairments in social and emotional capacities post injury (Sohlberg & Mateer, 2001, p. 378). As an educator, one must understand that there has been a loss for these individuals and mechanically, their brain is simply not performing the way they expect it to perform. Teaching relaxation techniques, cognitive behavioural therapy, acceptance and commitment therapy and fostering personal empowerment and self-sufficiency are all appropriate educational strategies one may use when working with this population with adults (Sohlberg & Mateer, p. 378-389, 2001). The following suggestions for social and emotional educational guidelines have been made by the BC Ministry of Education for children and adolescents with TBI (2000):

- Direct feedback on social behaviours
- Increase insight by discussing appropriate and inappropriate behaviours
- Encourage peers to inform student when behaviour is inappropriate
- Provide direct instruction in social behavioural skills
- Teach self-monitoring techniques
- Give positive reinforcement and praise success
- Role-model appropriate behaviours

(British Columbia Ministry of Education, 2000).

Considerations for Long-term Planning and Educational Implications

The majority of studies referenced in this paper, recommended meeting the learner where they are in terms of educational implications and long-term planning. It is important to assess where the individual is within all of these areas and address accordingly. It is also important to note that quicker intervention on behavioural challenges, can lead to best outcomes in the future. Formal assessments may be difficult for educators to interoperate. For example, a low reading score may be inaccurate due to the individual experiencing attending difficulties or fatigue at the time of assessment. While there may be similarities within educational impactions between individuals with TBI and other students with disabilities, there are differences.

- The disability itself is routed within a traumatic injury. This is a neurological disorder that occurs after an experience within normal development. It can be challenging for children or adults to adjust to their new level of functioning post injury.
- Individuals may have a previously identified ‘self’ pre-injury and are coping and adapting their new lives post-injury themselves. Activities that may have been perceived as ‘second nature’ pre injury may now be difficult.
- These individuals and their families most likely have no prior experience navigating the special education and disability services systems
- Individuals with TBI may have strong ‘foundational’ knowledge within their repertoire pre-injury.
- TBI may affect social relationships. With the increase of some of these maladaptive behaviours listed in previous sections, it may become difficult for support systems to adjust to the new behaviours the person is presenting. While these support systems may be aware of the changes the individual is presenting in their behaviour, the individual themselves may be completely unaware.

Consultants, teachers and healthcare professions should work together as a part of a multi-disciplinary team to promote healthy generalization and success when transitioning from rehabilitation settings into the community. The way in which an injury to the brain impacts a person is unique to that individual. Direct instruction, Positive behaviour support and Contingency management procedures all have evidence in assisting this population within their individual needs (Sohlberg & Mateer, 2001, Ylvisaker et al., 2007) . Impairments may be acute or chronic. Education and contextual support should be individualized.

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